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IS 9302-9-3 (1981): Characteristics and methods of measurements for sound system equipment, Part 9: Programme level meters, Section 3: peak programme meters, Type 2 [LITD 7: Audio, Video and Multimedia Systems and Equipment]



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Indian Standard

CHARACTERISTICS AND METHODS OF MEASUREMENTS FOR SOUND SYSTEM EQUIPMENT

PART IX PROGRAMME LEVEL METERS

Section 3 Peak Programme Meters, Type II

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CHARACTERISTICS AND METHODS OF MEASUREMENTS FOR SOUND SYSTEM EQUIPMENT

PART IX PROGRAMME LEVEL METERS

Section 3 Peak Programme Meters, Type II

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Indian Standard

CHARACTERISTICS AND METHODS OF MEASUREMENTS FOR SOUND SYSTEM EQUIPMENT

PART IX PROGRAMME LEVEL METERS

Section 3 Peak Programme Meters, Type II

0. FOREWORD

0.1 This Indian Standard (Part IX/Sec 3) was adopted by the Indian Standards Institution on 2 February 1981, after the draft finalized by the Acoustics Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The purpose of this standard is to specify the characteristics and methods of measurement for peak programme meters, Type II.

0.3 Different types of sound system equipment are being covered in a series of standards consisting of the following individual parts:

Part I	General
Part II	Amplifiers
Part III	Microphones
Part IV	Loudspeakers
Part V	Auxiliary passive elements
Part VI	Headphones
Part VII	Automatic gain control devices
Part VIII	Artificial reveberation, time delay and frequency shift equipment
Part IX	Programme level meters
Part X	Preferred matching values for the interconnection of sound system components

0.4 This standard covers peak programme meters used by broadcasting authorities both in studies and at transmission control points and for the exchange of programme between the countries.

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0.5 The Type IIa and IIb instruments differ only in respect of the scale divisions and marking. The Type IIa scale is used in a variety of sound control applications where the best possible use of the dynamic range is to be obtained by precise control of the microphone output.

0.6 Where it is required to compare by telephone the readings of peak programme meters at various points along a programme circuit during the course of the transmission, an extra facility may be incorporated; this is known as the 'slow' mode of operation and is obtained by inserting a network between the output of the processing amplifier and the display device (*see* Appendix A). This facility is only fitted to those Type IIa instruments used for supervision of transmission circuits but is an essential part of all Type IIb instruments.

0.7 While preparing this standard, assistance has been derived from IEC Pub 268-10A : 1978 First supplement to Publication 268-10 (1976) ' Sound system equipment: Part 10 Programme level meters ' issued by International Electrotechnical Commission.

0.8 In reporting the result of a test or analysis made in accordance with this standard, if the final values, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard (Part IX/Sec 3) specifies the characteristics and the methods of measurement for peak programme meters, Type II.

2. TERMINOLOGY AND EXPLANATION OF TERMS

2.0 For the purpose of this standard, the terms and definitions given in IS : 9302 (Part IX/Sec 1)-1980† shall apply, in addition to the following.

2.1 Pulse Response — The relation between different durations of isolated rectangular voltage pulses at constant amplitude and the corresponding indications. This test is designed to reveal spurious resonance conditions which, if present in the instrument, would cause erroneous readings on some types of programme waveform.

2.2 Dynamic Linearity Within Scale Range — The relation between the amplitudes of successive tone-bursts having a constant duration and

*Rules for rounding off numerical values (*revised*).

†Characteristics and methods of measurements for sound system equipment: Part IX Programme level meters, Section 1 General.

the corresponding indications. This test is designed to reveal significant non-linearity of the response to tone-bursts which would cause low-level programme to read differently on various designs of instruments having the same value of integration time.

2.3 Dynamic Response Below Minimum Calibration Point — The response of the instrument to the application of isolated tone-bursts at a level 30 dB below reference voltage. This test is designed to ensure that there are no significant threshold effects which would render doubtful the validity of the reading programme material having a wide dynamic range.

2.4 Overload Characteristic — The response of the instrument to isolated 1.5 ms tone-bursts at a level 10 dB above reference voltage. This test is designed to ensure that the overload capacity is adequate to register correctly programme material of all types.

3. CONDITIONS FOR MEASUREMENT

3.1 Provisions of 3 of IS : 9302 (Part IX/Sec 1)-1980* shall apply.

4. TESTS

4.1 Provisions of 4 of IS : 9302 (Part IX/Sec 1)-1980* shall apply.

5. REQUIREMENTS

5.1 Reference Indication

- a) Type IIa : This indication should be marked '6', and
- b) Type IIb : This indication should be marked with a graduation corresponding to + 9 dB.

5.2 Reference Voltage

- a) Type IIa : If not specified otherwise, the reference voltage should be 1.95 V; and
- b) Type IIb : If not specified otherwise, the reference voltage should be 2.18 V.

5.3 Indication Instrument

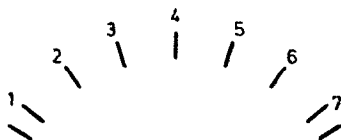
5.3.1 Division of the Scale

5.3.1.1 The scale of Type IIa instrument shall be divided into 6 approximately equal 4 dB divisions by numbered lines, marked in white

*Characteristics and methods measurements for sound system equipment: Part IX Programme level meters, Section 1 General.

IS : 9302 (Part IX/Sec 3) - 1981

on a matt black surface and carrying the numbers 1 to 7. The mark '4' shall be at the mid-scale position. A preferred scale layout with dimensions is given in Fig. 1.



Dial	Matt Black
Scale marks	White 6 mm in length for numbered marks 4 mm in length for end scale marks
Figures	Positioned at upper ends of scale marks Height: 2.5 to 3.5 mm
Pointer	Parallel type Nominal length: 45 mm Width: 0.8 ± 0.2 mm Minimum length visible at any reading: 50 percent Overlap onto scale marks: 3 to 4 mm

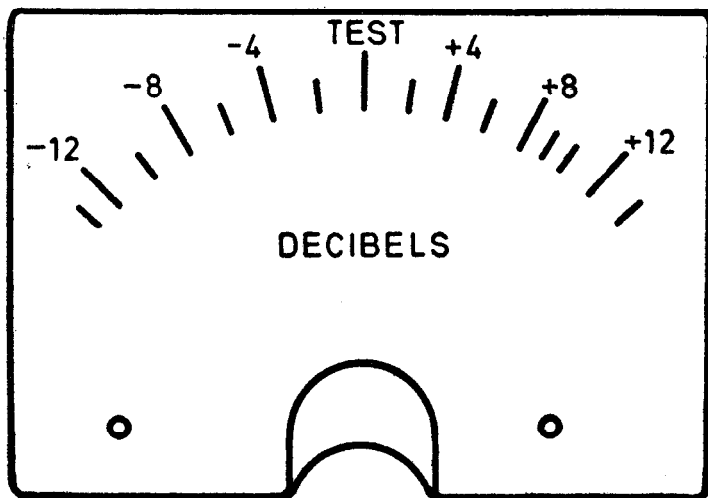
Total scale length measured along the arc defined by the tip of the pointer between the two end scale marks: 80 ± 5 mm.

FIG. 1 PREFERRED SCALE MARKINGS AND DIMENSIONS FOR
TYPE IIa PEAK PROGRAMME METERS

5.3.1.2 The scale of the Type IIb instrument shall be divided into twelve approximately equal 2 dB divisions marked in white on a matt black surface. The general form of the scale and the system of marking is given in Fig. 2. The principal scale markings are at the points at 4 dB intervals above and below the 'test' level mark which is at the mid-scale position. There is an additional mark at the point 9 dB above 'test' level. The total scale length shall be not less than approximately 8 cm.

5.3.1.3 Where a rigid pointer is used, this shall be of the parallel type, usually white in colour and having at least 50 percent of its length clearly visible at any deflection.

5.4 Preferred Indicating Instrument — To promote interchangeability between amplifiers and indicating instruments, details of the preferred indicating instrument are given in Appendix B.



Scale shown full-size. Dimensions of scale and pointer are as stated for Type IIa instrument in Fig. 1.

FIG. 2 PREFERRED SCALE MARKINGS FOR TYPE IIb PEAK PROGRAMME METERS

5.5 Calibration Tolerances

5.5.1 To enable the complete instrument to be used for checking line-up tones at other than reference voltage, the indication shall be within the following limits when a sinusoidal voltage at 1 kHz, having a distortion less than 1 percent, is applied to the input terminals.

*Indicating Instrument Reading
(Neglecting Drift Due to
Temperature or Supply Voltage
Variation)*

*Relative Input Voltage
(rms)
(dB)*

Type IIa	Type IIb	
Min	Min	$-\infty$
1	- 12	$- 12 \pm 0.5$
2	- 8	$- 8 \pm 0.3$ (See Note)
3	- 4	$- 4 \pm 0.3$
4	TEST	0
5	+ 4	$+ 4 \pm 0.3$
6	+ 8	$+ 8 \pm 0.3$ (See Note)
7	+ 12	$+ 12 \pm 0.5$

NOTE — It is preferable that the amplifier has controls such that the tolerances on the values 'minimum', - 8, 0 and + 8 may be eliminated simultaneously.

5.6 Amplitude Frequency Response

5.6.1 Within the effective frequency range, the deviations from the ideal 'flat' response shall be less than ± 0.3 dB at each scale division between '2' and '6' inclusive for the Type IIa meter, or between '-8' and '+8' inclusive for the Type IIb meter. Above 16 kHz, the response shall fall smoothly to at least 100 kHz and lie within the limits of 0 dB and -6 dB at 40 kHz. Below 31.5 Hz, the response shall lie within ± 2 dB down to 12 Hz and fall smoothly below this frequency.

5.7 Effective Frequency Range

5.7.1 The effective frequency range shall be 31.5 to 16 000 Hz.

5.8 Dynamic Response

5.8.1 *Dynamic Response in Normal Mode* — The dynamic response shall be in accordance with the following relations between burst duration and indications, taking the reference voltage as 1.94 V rms in both cases:

Burst Duration (ms)	Type IIa Indication	Type IIb Indication	Tolerance, dB
100	6	+ 8	± 0.5
10	$5\frac{1}{2}$	+ 6	± 0.5
5	5	+ 4	± 0.75
1.5	$3\frac{3}{4}$	- 1	± 1.0
0.5 (see Note)	$1\frac{3}{4}$	- 9	± 2.0

NOTE — Since it is necessary for the tone-burst to include a minimum number of 5 cycles, a frequency of at least 10 kHz is required for this measurement.

5.8.2 *Dynamic Response in 'Slow' Mode* — The dynamic response shall be in accordance with the following relations between burst-duration, burst repetition period and indications, taking the reference voltage as 1.94 V rms in both cases:

Burst Duration (ms)	Type IIa Indication	Type IIb Indication	Tolerance, dB
5 000	6	+ 8	± 0.5
10	$3\frac{1}{4}$	- 3	± 1
10 (repeated at 100 ms intervals)	$5\frac{3}{4}$	+ 7	± 0.5

NOTE — The above values apply to instruments having the logarithmic stage preceded by the integration circuit. Early instruments arranged differently use other values in order to give the same readings on programme signal.

5.9 Integration Time — The integration time in normal mode shall be 10 ± 2 ms.

5.10 Pulse Response (Normal Mode) (see 2.1) — Isolated unidirectional rectangular voltage pulses with a duration of about 1 ms are applied to the input terminals and the pulse amplitude adjusted to give an indicated reading to '4' on Type IIa meter, or 'TEST' on Type IIb meter. When the pulse duration is progressively shortened to less than 50 μ s, the indicated reading shall progressively decrease. The indicated reading for a pulse duration of 100 μ s shall not be greater than - 10 dB relative to '4' (or 'TEST').

5.11 Dynamic Linearity Within Scale Range (Normal Mode) (see 2.2) — When the amplitudes of successive tone bursts, having a constant duration of 10 ms (the amplitude of the initial burst having been adjusted to give reference indication) are reduced progressively the indications shall decrease by directly proportional amounts (within 1 dB) over the scale range of the instrument.

NOTE — For accurate measurement of the deflections observed in the dynamic linearity test, it is necessary to substitute continuous tone, in each case adjusting the level until the same pointer deflection is observed.

5.12 Dynamic Response Below Minimum Calibration Point (Normal Mode) (see 2.3) — Isolated 10 ms tone bursts (of 5 kHz) at a level of 30 dB below reference voltage shall cause just perceptible movements of the pointer, that is, approximately 1 mm deflection at the tip of the pointer.

5.13 Overload Characteristic (Normal Mode) (see 2.4) — When the amplitude of isolated 5 kHz bursts of 1.5 ms duration, corresponding to reference voltage, is increased by 10 dB, the resulting increase in reading shall be not less than 5 dB and not greater than 10 dB.

5.14 Delay Time (Normal Mode) — The delay time shall not be greater than 150 ms.

5.15 Overswing — The overswing shall not be greater than 0.5 dB.

5.16 Return Time — In normal mode, the time taken for the pointer, to return from mark '7' to mark '1' (Type IIa) or mark '+ 12' to mark '- 12' (Type IIb) shall be 2.8 ± 0.3 second. When the instrument is operating in the 'slow' mode, the return time defined in this way shall be 3.8 ± 0.5 s.

The return speed (that is, dB/s) should be approximately constant. On multiple instruments intended for monitoring multi-channel programmes, the difference in return time should be less than 0.1 second.

5.17 Reversibility Error — The reversibility error shall not be greater than 0.5 dB.

5.18 Input Impedance — The input impedance shall be at least 50 times the highest value of source impedance with which the instrument is likely to be connected.

NOTE — This condition need not necessarily be fulfilled if the meter is permanently built into equipment and permanently connected to the source, providing that the input impedance is practically constant with the effective frequency range.

5.19 Distortion Introduced by the Peak Programme Meter — The total non-linear distortion introduced by the meter into a source of 600 Ω impedance shall be less than 0.1 percent even if the supply voltage to the electronic unit is switched off.

5.20 Temperature Range — The drift in indicated readings with a change in ambient temperature from + 10°C to + 50°C shall not exceed the following:

Type IIa scale	Minimum	2	4	6
Type IIb scale	(no-signal mark)	— 8	TEST	+ 8
Drift	3.75 percent of scale length	$\pm 1.3\text{dB}$	$\pm 0.5\text{dB}$	$\pm 0.2\text{dB}$

Correction of 'zero' drift by electrical adjustment shall result in reduction of calibration errors.

5.21 Overload Input Level

5.21.1 The overload input level shall be at least 20 dB above reference voltage for an unlimited period of time.

5.22 Supply Voltage Range

5.22.1 The drift in indicated readings with power supply voltage deviations between — 10 percent and + 10 percent of the rated value shall not exceed the following:

Type IIa scale	Minimum	6
Type IIb scale	(no-signal mark)	+ 8
Drift (total)	2.5 percent of scale length	0.5 dB

Correction of 'zero' drift by electrical adjustment shall result in reduction of calibration errors.

APPENDIX A

(Clause 0.6)

SLOW MODE OF OPERATION

A-1. The 'slow' mode may be obtained by inserting a network with the following characteristics between the output of the processing amplifier and the display device.

The total resistance of the meter circuit should be ascertained (including the output resistance R_s of the processing amplifier, the display device R_m and any series resistance R_1 provided to allow for the possibility of adding extra display devices in series with the main one) and this value divided in the proportions 13:10 (the former corresponding to the source resistance). A capacitor of value such that when its value is multiplied by the total load resistance calculated above gives a product equal to 1.15 seconds, should be connected between the points in the circuit which divide it in the ratio previously mentioned.

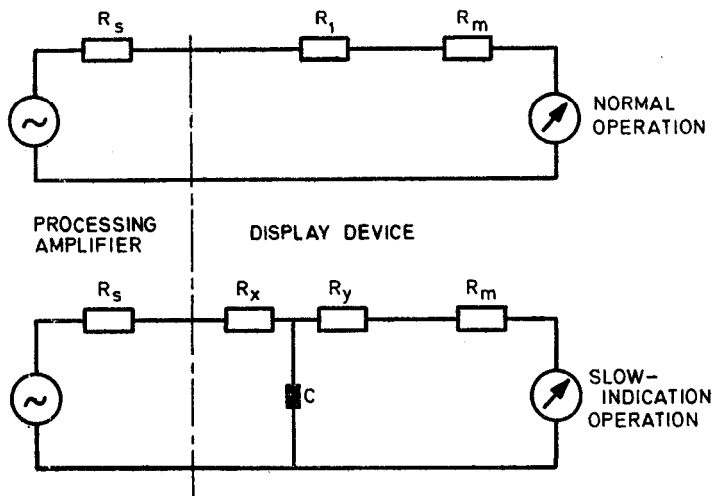


FIG. 3 CIRCUIT USED TO OBTAIN THE SLOW-INDICATION MODE

The values of C , R_x and R_y are determined by the following equations:

$$R_x + R_y - R_1 \quad \frac{R_s + R_x}{R_m + R_y} = 1.3 \quad C(R_m + R_y) = 1.15$$

NOTE— The above values apply to instruments having the logarithmic stage preceded by the integration circuit. Early instruments arranged differently use other values in order to give the same readings on programme signal.

APPENDIX B

(Clause 5.4)

DETAILS OF PREFERRED INDICATING INSTRUMENT

B-1. FULL SCALE CURRENT

1 mA $\pm$ 2 percent

B-2. CALIBRATION OF INDICATING INSTRUMENT

The relationship between the deflection and current shall be as follows, to an accuracy of $\pm$ 1 percent of the full-scale value:

<i>Type IIa</i> <i>Scale Mark</i>	<i>Type IIb</i> <i>Scale Mark</i>	<i>Percent Full Scale Current</i>
<i>Minimum Scale Value</i>		0
1	— 12	10
2	— 8	22
3	— 4	35
4	TEST	51
5	+ 4	67
6	+ 8	80
7	+ 12	93
Full scale		100

B-3. DAMPING

When a direct current giving a pointer deflection to mark '7' (0.93 mA) (Type IIa) or '+ 12' (Type IIb) is suddenly applied from a source resistance of $100 \text{ k } \Omega \pm 5$ percent, the pointer overshoot shall not exceed 5 percent of the steady-rate reading.

B-4. SPEED

When a rectangular, unidirectional pulse of the stated duration and with a peak emf equal to the steady (dc) emf which causes a pointer deflection to the mark '7' (that is, 0.93 mA) (Type IIa) or '+ 12' (Type IIb) is applied to the indicating instrument from a source resistance of $6.2 \text{ k } \Omega \pm 5$ percent, the response shall be as follows:

<i>Pulse Duration</i>	<i>Peak Reading Relative to Mark '7'</i>
80 ms	— 3.5 ± 1 dB
20 ms	— 19 ± 1 dB